

$B_J(5970)$

$$I(J^P) = \frac{1}{2}(??)$$

I, J, P need confirmation.

Quantum numbers shown are quark-model predictions.

 $B_J(5970)$ MASS **$B_J(5970)^+$ MASS**OUR FIT uses m_{B^0} and $m_{B_J(5970)^+} - m_{B^0}$ to determine $m_{B_J(5970)^+}$.

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>
5964 ± 5 OUR FIT	

 $m_{B_J(5970)^+} - m_{B^0}$

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
685 ± 5 OUR FIT				
685 ± 5 OUR AVERAGE				

685.3 ± 4.1 ± 2.5 2k ¹ AAIJ 15AB LHCB pp at 7, 8 TeV681 ± 5 ± 12 1.4k ² AALTONEN 14l CDF $p\bar{p}$ at 1.96 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

686.8 ± 4.5 ± 2.5 2k ³ AAIJ 15AB LHCB pp at 7, 8 TeV¹ AAIJ 15AB reports $[m_{B_J^+} - m_{B^0}] - m_{\pi^+} = 545.8 \pm 4.1 \pm 2.5$ MeV which we adjust bythe π^+ mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = (-1)^J$ and uses two relativistic Breit-Wigner functions in the fit for mass difference.² AALTONEN 14l reports $m_{B_J(5970)^+} - m_{B^0} - m_{\pi^+} = 541 \pm 5 \pm 12$ MeV which we adjusted by the π^+ mass.³ AAIJ 15AB reports $[m_{B_J^+} - m_{B^0}] - m_{\pi^+} = 547 \pm 5 \pm 3$ MeV which we adjust bythe π^+ mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = (-1)^J$ and uses three relativistic Breit-Wigner functions in the fit for mass difference. **$m_{B_J(5970)^+} - m_{B^{*0}}$**

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •				

686.0 ± 4.0 ± 2.5 2k ¹ AAIJ 15AB LHCB pp at 7, 8 TeV¹ AAIJ 15AB reports $[m_{B_J^+} - m_{B^0}] - (m_{B^{*+}} - m_{B^+}) - m_{\pi^+} = 547 \pm 4 \pm 3$ MeV whichwe adjust by the π^+ mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = -(-1)^J$, $(m_{B^{*0}} - m_{B^0}) = (m_{B^{*+}} - m_{B^+}) = 45.01 \pm 0.30 \pm 0.23$ MeV, and uses three relativistic Breit-Wigner functions in the fit for mass difference. **$B_J(5970)^0$ MASS**OUR FIT uses m_{B^+} and $m_{B_J(5970)^0} - m_{B^+}$ to determine $m_{B_J(5970)^0}$.

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>
5971 ± 5 OUR FIT	

$m_{B_J(5970)^0} - m_{B^+}$

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
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691 ±5 OUR FIT**691 ±5 OUR AVERAGE**

689.9 ± 2.9 ± 5.1	10k	¹ AAIJ	15AB LHCB	pp at 7, 8 TeV
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698 ± 5 ± 12	2.6k	² AALTONEN	14i CDF	$p\bar{p}$ at 1.96 TeV
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• • • We do not use the following data for averages, fits, limits, etc. • • •

714.3 ± 6.4 ± 5.1	10k	³ AAIJ	15AB LHCB	pp at 7, 8 TeV
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¹ AAIJ 15AB reports $[m_{B_J^0} - m_{B^+}] - m_{\pi^-} = 550.4 \pm 2.9 \pm 5.1$ MeV which we adjust by

the π^- mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = (-1)^J$ and uses two relativistic Breit-Wigner functions in the fit for mass difference.

² AALTONEN 14i reports $m_{B_J(5970)^0} - m_{B^+} - m_{\pi^-} = 558 \pm 5 \pm 12$ MeV which we adjusted by the π^- mass.

³ AAIJ 15AB reports $[m_{B_J^0} - m_{B^+}] - m_{\pi^-} = 575 \pm 6 \pm 5$ MeV which we adjust by

the π^- mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = (-1)^J$ and uses three relativistic Breit-Wigner functions in the fit for mass difference.

 $m_{B_J(5970)^0} - m_{B^{*+}}$

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

691.6 ± 3.7 ± 5.1	10k	¹ AAIJ	15AB LHCB	pp at 7, 8 TeV
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¹ AAIJ 15AB reports $[m_{B_J^0} - m_{B^+}] - (m_{B^{*+}} - m_{B^+}) - m_{\pi^-} = 552 \pm 4 \pm 5$ MeV

which we adjust by the π^- mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = -(-1)^J$, $(m_{B^{*+}} - m_{B^+}) = 45.01 \pm 0.30 \pm 0.23$ MeV, and uses three relativistic Breit-Wigner functions in the fit for mass difference.

 $B_J(5970)$ WIDTH **$B_J(5970)^+$ WIDTH**

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
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62 ± 20 OUR AVERAGE

63 ± 15 ± 17	2k	¹ AAIJ	15AB LHCB	pp at 7, 8 TeV
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60 ⁺³⁰ ₋₂₀ ± 40	1.4k	AALTONEN	14i CDF	$p\bar{p}$ at 1.96 TeV
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• • • We do not use the following data for averages, fits, limits, etc. • • •

61 ± 14 ± 17	2k	² AAIJ	15AB LHCB	pp at 7, 8 TeV
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61 ± 15 ± 17	2k	³ AAIJ	15AB LHCB	pp at 7, 8 TeV
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¹ Assuming $P = (-1)^J$ and using two relativistic Breit-Wigner functions in the fit for mass difference.

² Assuming $P = (-1)^J$ and using three relativistic Breit-Wigner functions in the fit for mass difference.

³ Assuming $P = -(-1)^J$ and using three relativistic Breit-Wigner functions in the fit for mass difference.

$B_J(5970)^0$ WIDTH

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
81 ± 12 OUR AVERAGE				
82 ± 8 ± 9	10k	¹ AAIJ	15AB LHCB	pp at 7, 8 TeV
70 ⁺³⁰ ₋₂₀ ± 30	2.6k	AALTONEN	14i CDF	$p\bar{p}$ at 1.96 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

56 ± 7 ± 9	10k	² AAIJ	15AB LHCB	pp at 7, 8 TeV
82 ± 10 ± 9	10k	³ AAIJ	15AB LHCB	pp at 7, 8 TeV

¹ Assuming $P = (-1)^J$ and using two relativistic Breit-Wigner functions in the fit for mass difference.

² Assuming $P = (-1)^J$ and using three relativistic Breit-Wigner functions in the fit for mass difference.

³ Assuming $P = -(-1)^J$ and using three relativistic Breit-Wigner functions in the fit for mass difference.

 $B_J(5970)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)
Γ_1 $B\pi$	possibly seen
Γ_2 $B^*\pi$	seen

 $B_J(5970)$ BRANCHING RATIOS

$\Gamma(B\pi)/\Gamma_{\text{total}}$					Γ_1/Γ
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
possibly seen	2k	¹ AAIJ	15AB LHCB	±	pp at 7, 8 TeV
possibly seen	10k	¹ AAIJ	15AB LHCB	0	pp at 7, 8 TeV
possibly seen	2.6k	AALTONEN	14i CDF	0	$p\bar{p}$ at 1.96 TeV
possibly seen	1.4k	AALTONEN	14i CDF	±	$p\bar{p}$ at 1.96 TeV

¹ A $B\pi$ decay is forbidden from a $P = -(-1)^J$ parent, whereas $B^*\pi$ is allowed.

$\Gamma(B^*\pi)/\Gamma_{\text{total}}$					Γ_2/Γ
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
seen	10k	AAIJ	15AB LHCB	0	pp at 7, 8 TeV
seen	2k	AAIJ	15AB LHCB	±	pp at 7, 8 TeV
seen	2.6k	AALTONEN	14i CDF	0	$p\bar{p}$ at 1.96 TeV
seen	1.4k	AALTONEN	14i CDF	±	$p\bar{p}$ at 1.96 TeV

 $B_J(5970)$ REFERENCES

AAIJ	15AB JHEP 1504 024	R. Aaij <i>et al.</i>	(LHCb Collab.)
AALTONEN	14i PR D90 012013	T. Aaltonen <i>et al.</i>	(CDF Collab.)